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(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 581646

- (54) Title  
ADJUSTABLE SUPPORT FOR KEYBOARD DEVICE
- (51)<sup>4</sup> International Patent Classification(s)  
A47B 021/02 A47B 005/00
- (21) Application No. : 39874/85 (22) Application Date : 21.03.84
- (23) Filing Date of Complete Specification : 14.03.85
- (43) Publication Date : 26.09.85
- (44) Publication Date of Accepted Application : 02.03.89
- (60) Related to Provisional(s) : PG4168
- (71) Applicant(s)  
ANSTEY PTY. LTD.
- (72) Inventor(s)  
KENNETH DAVID ANSTEY
- (74) Attorney or Agent  
G.R. CULLEN & COMPANY, BRISBANE.
- (56) Prior Art Documents  
10051/83 558310 A47B 13/00, 21/02, 37/00  
15412/83 A47B 13/00, 21/02, 37/00  
32536/78 507771 A47B 5/04, 13/06
- (57) Claim

1. A support assembly for supporting a control device relative to a fixed support including:  
support means for supporting the control device;  
attachment means for attachment of the support assembly to the fixed support;  
linkage means pivotally interconnecting each of the support means and attachment means;  
pivotal mounting means pivotally attaching the linkage means to the support means;  
fluid operated means for actuating movement of the linkage means wherein said support means may move in a direction spaced from the fixed support, said fluid operated means being pivotally attachable to the attachment means and to the pivotal mounting means, and including a cylinder mounted on a piston rod, whereby relative movement may occur between the cylinder and the piston rod upon compression or expansion of fluid within the cylinder; and

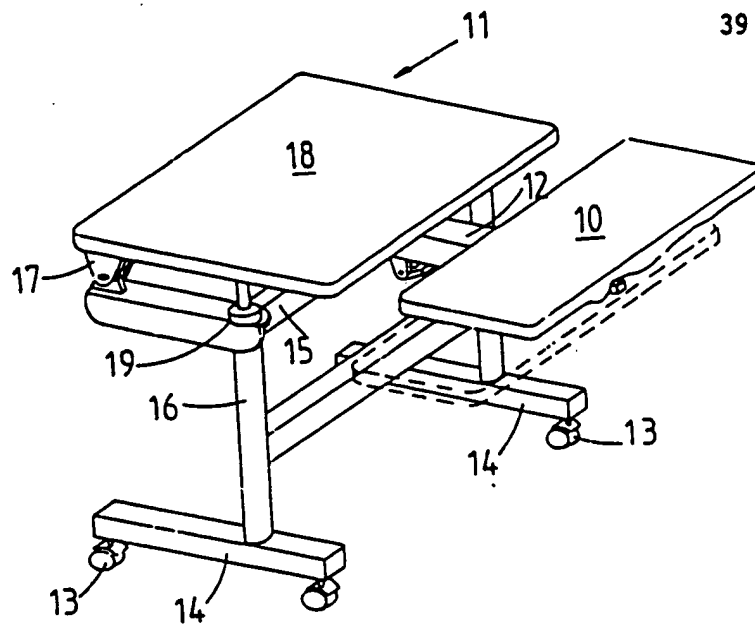


FIG. 1

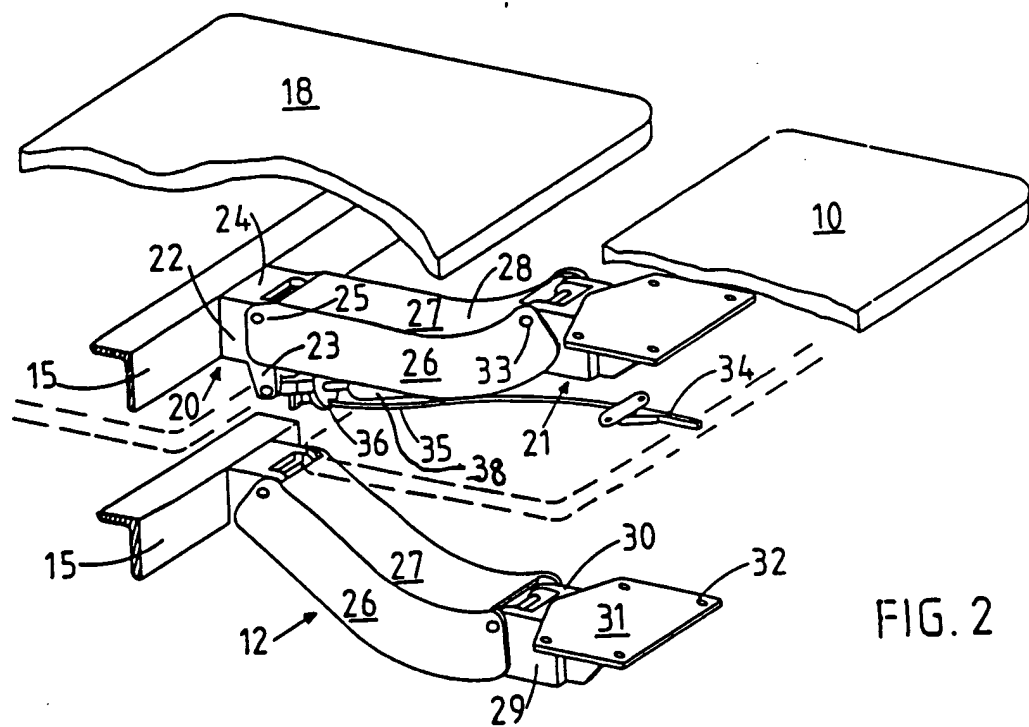


FIG. 2

- (54) Title  
ADJUSTABLE SUPPORT FOR KEYBOARD DEVICE
- (51)<sup>4</sup> International Patent Classification(s)  
A47B 021/02 A47B 005/00
- (21) Application No. : 39874/85 (22) Application Date : 21.03.84
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1. A support assembly for supporting a control device relative to a fixed support including:

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attachment means for attachment of the support assembly to the fixed support;

linkage means pivotally interconnecting each of the support means and attachment means;

pivotal mounting means pivotally attaching the linkage means to the support means;

fluid operated means for actuating movement of the linkage means wherein said support means may move in a direction spaced from the fixed support, said fluid operated means being pivotally attachable to the attachment means and to the pivotal mounting means, and including a cylinder mounted on a piston rod, whereby relative movement may occur between the cylinder and the piston rod upon compression or expansion of fluid within the cylinder; and

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39874/85

[This document contains the  
full text of the patent  
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Name of Applicant: ANSTEY PTY. LTD. a company incorporated under the laws  
of the State of Queensland of 36 Activity Street,  
Address of Applicant: Acacia Ridge, Queensland, 4110

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6th Floor, Medibank Building,  
82 Ann Street,  
BRISBANE 4000  
Queensland, Australia.

COMPLETE SPECIFICATION FOR THE INVENTION ENTITLED:

SUPPORT ASSEMBLY

The following statement is a full description of the invention  
including the best method of performing it known to us:

THIS INVENTION relates to a support assembly for supporting a control device relative to a fixed support or location such as a wall, platform or bench.

5 This invention in one preferred aspect is especially suitable for supporting a keyboard or other finger-operated device relative to a workbench or table which may support visual display apparatus such as the visual display unit (V.D.U) of a computer word processor or other electronic equipment.

10 Hitherto it has been highly desirable to design apparatus for supporting a keyboard relative to a VDU whereby the keyboard was height adjustable relative to the VDU for the main reason that the position of keyboard operator was one that could be filled by a number of people of different heights who therefore would require varying keyboard heights for individual comfort and also to achieve maximum working efficiency. Such support apparatus would be considered preferable for  
15 example to apparatus that could only support the keyboard at a fixed height relative to the VDU such as a rigid support bracket inter-connecting the keyboard carrier to a table carrying the VDU.

20 In one conventional apparatus of the type described above there was provided a keyboard support which was mounted on a tubular support shaft wherein a rod or tube attached to the keyboard support was telescopically engageable with the tubular support shaft and there was provided jacking means to make the keyboard support height adjustable relative to the support shaft. Located adjacent the keyboard support  
25 was the work platform or table. While this arrangement was satisfactory in some respects it was found that it was bulky or cumbersome and was difficult to operate by inexperienced personnel such as junior typists. Also the actuating mechanism for initiating movement of the keyboard support was often inaccessible.

30 In another conventional arrangement there was provided a keyboard support which was connected by a linkage arm to a fixed table which carried a VDU. The linkage arm operated on a pantograph or parallelogram linkage which was controlled by springs. When it was desired to lock the keyboard support in a desired position relative to  
35 the VDU it was necessary to actuate a mechanical locking arrangement

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control means for controlling the fluid operated means, said control means comprising a control lever or pedal operatively associated therewith so as to cause said compression or expansion of fluid within the cylinder.

which again was not always the most appropriate arrangement to be operated by inexperienced personnel. Also because of the spring control means often the movement of the keyboard support relative to the VDU was uncontrolled or jerky and did not give a smooth controlled movement. Also the mechanical locking arrangement was also found to be relatively difficult to operate in the case of inexperienced personnel and often the locking arrangement was relatively inaccessible to the operator.

It is therefore an object of the invention to provide a support assembly which may alleviate the abovementioned problems associated with the prior art.

Accordingly, the invention provides a support assembly for supporting a control device relative to a fixed support comprising:

support means for supporting the control device;  
attachment means for attachment of the support assembly to the fixed support;  
linkage means pivotally interconnecting each of the support means and attachment means;  
pivotal mounting means pivotally attaching the linkage means to the support means;

fluid operated means for actuating movement of the linkage means wherein said support means may move in a direction spaced from the fixed support, said fluid operated means being pivotally attachable to the attachment means and to the pivotal mounting means, and including a cylinder mounted on a piston rod, whereby relative movement may occur between the cylinder and the piston rod upon compression or expansion of fluid within the cylinder; and

control means for controlling the fluid operated means, said control means comprising a control lever or pedal operatively associated therewith so as to cause said compression or expansion of fluid within the cylinder.

The support means suitably comprises a bench, tabletop, desk or other suitable flat or planar surface for supporting a keyboard, machine or other implement or device.

5 The attachment means may comprise an attachment bracket to a vertical surface such as a wall or horizontal surface such as a bench or table. Preferably the attachment bracket is bifurcated having a web and opposed arms which have a pair of aligned apertures for the insertion therethrough of a first or top pivot pin and a second or lower pivot pin for a reason as hereinafter discussed. The web may be attached to an adjacent vertical surface of a structural member of the table or bench. The attachment bracket may also include a pair of opposed downwardly extending lugs which also have a pair of opposed apertures for the insertion therethrough of a third pivot pin for a reason as hereinafter discussed.

15 The linkage means is suitably a linkage arm of integral or one piece construction which preferably is of channel shape having a top web and a pair of downwardly extended and opposed flanges. The rear end of the linkage arm may be provided with a pair of outwardly extending ears or lugs for mounting of the aforementioned top pivot pin which attaches the rear end of the linkage arm to the attachment bracket.

25 However it will be appreciated that the linkage means or linkage arm may be of any suitable shape other than that described above such as being substantially planar or platelike if desired having a pair of opposed broad surfaces and a pair of opposed narrow surfaces or edges.

30 The linkage means may be curved or tapered intermediate its length so as to facilitate the support means being located in a common horizontal plane with the fixed support if desired.

There also may be provided mounting means such as a mounting bracket attaching the front end of the linkage arm to the support means. Preferably the mounting bracket may adopt



the same shape as the attachment bracket having a channel shape with a front web and opposed rearwardly extending flanges. The mounting bracket may also include a top pivot pin for pivotally supporting the front end of the linkage arm and a second pin for a reason as hereinafter discussed.

The fluid operated means for actuating pivotal movement of the linkage arm may be hydraulic or pneumatic in nature. Preferably however the fluid operated means is a gas spring including a cylinder mounted on a piston rod whereby suitably relative movement may occur between the cylinder and the piston rod so as to compress gas within the cylinder. A suitable gas spring is for use in the invention is one marketed under the SUSPA trade mark or BLOCK-O-LIFT trade mark and manufactured by West German firms.

In a preferred form of gas spring for use in the invention there may be provided an inner sleeve or piston having a central gas chamber and an outer concentric gas chamber. Relative movement may occur between the inner sleeve and an outer sleeve or cylinder containing an end gas chamber. At its free end or end remote from the outer sleeve the inner sleeve may contain a valve mechanism having a valve stem initially movable downwardly or inwardly relative to the surrounding inner sleeve to reach an open position so as to allow communication between the central gas chamber, the concentric gas chamber and the end chamber. In a compression stroke gas exits from the central gas chamber to the end

- chamber via the concentric chamber and in an expansion stroke the reverse occurs. In either the compression stroke or expansion stroke relative movement occurs between the cylinder and piston.

There also may be provided control means for controlling the fluid operated means. In one form this may comprise a valve for controlling flow of fluid into or out of the cylinder with specific reference to a hydraulic ram assembly or pneumatic ram assembly. With specific reference to the embodiment described above this may comprise a control lever attached to an operating cable which is secured to a lug pivotally mounted to a holding bracket interposed between the rear attachment bracket and the piston of the gas spring referred to above. The pivoted lug may be attached to the valve stem of the valve mechanism previously described. Upon movement of the operating cable this may effect inward movement of the valve stem to cause the cylinder to move relative to the piston which is fixed in this particular embodiment.

In another form the control means may comprise a foot or knee operated pedal for causing movement of the operating cable in substitution of a finger operated control lever as described above.

In an alternative embodiment the attachment bracket may be associated with a track or channel member for reciprocation in a forward or reverse direction which track may be attached to the underside of a bench or table supporting the VDU. In this embodiment there also may be provided means for pivoting the assembly of support means and linkage means about a vertical axis so that the assembly may be moved rearwardly whereby said attachment bracket may move on the track and subsequently pivoted so as to be retracted or be located underneath the table or bench supporting the VDU.

Reference may now be made to a preferred embodiment of the invention as shown in the accompanying drawings wherein:

FIG 1 is a perspective view of a support assembly constructed in accordance with the invention;

FIG 2 is a partly broken away perspective view of the linkage arm interconnecting the keyboard support and the work table which supports the VDU of the assembly shown in FIG 1;

FIG 3 is a perspective view of the modified support assembly constructed in accordance with the invention; FIG 3a is a top plan view of the modified support assembly shown in FIG 3; and

FIG 4 is a view similar to FIG 2 but showing portion of the linkage arm broken away to illustrate the gas spring and support member therefor.

In the drawings there is shown keyboard support 10 and work table 11 and linkage arm 12 interconnecting support 10 and work table 11. Work table 11 is mounted on castors 13 and includes horizontal legs 14, uprights 16 and frame members 15. There is also shown pivot joints 17 interconnecting tabletop 18 to frame members 15 and angle adjustment mechanism 19 for adjustment of the angle of tabletop 18 relative to the horizontal.

The linkage arm 12 is attached to rear attachment bracket 20 and also to front mounting bracket 21. Bracket 20 includes opposed sides 22 and downwardly extending lugs 23. The web 24 of bracket 20 is welded to frame member 15. There is also shown top pivot pin 25 pivotally attaching linkage arm 12 to bracket 20.

The linkage arm 12 is channel shaped as shown having opposed side walls 26 and top web 27 and is bent or curved at 28 so as to allow keyboard support 10 to be located in substantially the same horizontal plane as tabletop 18 if desired.

There is also shown front mounting bracket 21 which is also channel shaped having opposed sides 29, and web part 30 which has attachment plate 31 welded thereto. Plate 31 has attachment apertures 32 for attachment to keyboard 10 by bolts or screws (not shown). There is also shown top pivot pin 33 pivotally attaching bracket 21 to linkage arm 12.

Also shown is control lever 34 which is readily accessible to the operator of keyboard support 10 as shown. Lever 34 controls operation of operating cable 35 which extends through aperture 36 of end mounting member 37 of gas spring 38 best shown in FIG 4. Mounting member 37 also has a pivoted lug 39 which when pulled forwardly by cable 35 actuates the valve member (not shown) of gas spring 38 thereby resulting in actuation of gas spring 38 whereby cylinder 41 will move on piston rod 42 to thereby pivot linkage arm 12 relative to brackets 20 and 21.

In FIG 1 or FIG 4 the gas spring 38 is shown in an extended position whereby keyboard support 10 is substantially in the same horizontal plane as tabletop 18. In a retracted position the keyboard support 10 will be located below tabletop 18 as best shown in FIG 2 in dotted outline

wherein piston rod 42 will be fully retracted within cylinder 41. There is also shown tension spring 43 attached to top pivot pin 25 which is also attached to support member 44 for gas spring 38.

There are also shown bottom pivot pins 45, 45A and 46 of rear bracket 20 and front bracket 21 which pivotally attach support member 44 to both brackets 20 and 21 as best shown in FIG 4. Tension spring 43 biases keyboard support to the upper position as is also shown in FIG 4.

In FIGS 3 and 3A the rear bracket 20 is modified so as to be attached to a slider plate 47 having roller bearings 48 and friction pad 49 made of resilient material. The slider plate 47 may reciprocate back and forth on track 50 having a top plate component 51 and track rails 52. There is also shown stop member 53 and mating stop member 54 on linkage arm 12 which prevents keyboard support 10 from moving below tabletop 18 in any position other than the lowest or minimum position. There is also shown rear pivot block 55 having adjacent bearing faces 56 which is mounted on vertical pivot pin 57 and front pivot block 59 having adjacent bearing faces 58 which is mounted on from vertical pivot pin 60.

In the lowest or minimum position as shown in dotted outline keyboard support 10 may be fully retracted below tabletop 18. Both keyboard support 10 and linkage arm 12 are independently pivotable as shown by the arrows. This is useful in the situation where two people are sharing the same keyboard mounted on keyboard support 10.

In operation of the abovementioned preferred embodiment the keyboard support 10 may be adjusted infinitely insofar as height adjustment is concerned relative to tabletop 18 by actuation of control lever 34. When it is desired to lower keyboard support 10 the gas spring 37 will be in a compression stroke as described previously and when the keyboard support 10 is being elevated the gas spring 37 will be in an expansion stroke.

The support assembly is therefore constructed with a view to providing appropriate vertical adjustment of keyboard support 10 relative to tabletop 18 with the least physical effort. The provision of pivot pins 25, 45A, 33 and 46 provide a parallelogram linkage between the keyboard support 10 and the fixed frame member 15 constituted by linkage arm 12 and support member 44.

The claims defining the invention are as follows:

1. A support assembly for supporting a control device relative to a fixed support including:
  - support means for supporting the control device;
  - attachment means for attachment of the support assembly to the fixed support;
  - linkage means pivotally interconnecting each of the support means and attachment means;
  - pivotal mounting means pivotally attaching the linkage means to the support means;
  - fluid operated means for actuating movement of the linkage means wherein said support means may move in a direction spaced from the fixed support, said fluid operated means being pivotally attachable to the attachment means and to the pivotal mounting means, and including a cylinder mounted on a piston rod, whereby relative movement may occur between the cylinder and the piston rod upon compression or expansion of fluid within the cylinder; and
  - control means for controlling the fluid operated means, said control means comprising a control lever or pedal operatively associated therewith so as to cause said compression or expansion of fluid within the cylinder.
2. A support assembly as claimed in claim 1 wherein the support means includes a substantially planar support surface which in use is oriented in a direction substantially parallel to a corresponding planar support surface of the fixed support.
3. A support assembly as claimed in claim 1 or 2 wherein the attachment means includes an attachment bracket having a pair of adjacent arms and a pivot pin interconnecting each arm and operatively attached to the linkage means.
4. A support assembly as claimed in claim 3 wherein the attachment bracket also includes a web interconnecting each adjacent arm thereof and attachable to a mating surface of the fixed support.

5. A support assembly as claimed in any preceding claim wherein the linkage means includes a linkage arm which is curved or tapered intermediate its length so as to facilitate the support means to be located in a common horizontal plane with the fixed support if desired.
6. A support assembly as claimed in claim 5 wherein the linkage arm is channel shaped having a top web and pair of opposed flanges.
7. A support assembly as claimed in any preceding claim wherein the pivotal mounting means includes a mounting bracket having a pair of adjacent arms and an interconnecting web or mounting plate attached to the support means.
8. A support assembly as claimed in claim 7 wherein there is further provided a pivot pin interconnecting each adjacent arm of said pivotal mounting means and operatively associated with the linkage means.
9. A support assembly as claimed in claim 10 wherein the control means for controlling the fluid operated means is accessible to a person sitting at the support means.
10. A support assembly as claimed in any preceding claim wherein there is further provided a lug pivotally mounted to a holding bracket operatively associated with the fixed support and which lug is attached to a control cable associated with the control means wherein said lug is actuated to cause said compression or expansion of fluid within said cylinder.
11. A support assembly as claimed in any preceding claim wherein the attachment means is operatively associated with a track or channel member for reciprocation in a forward or reverse direction relative to the fixed support.
12. A support assembly as claimed in claim 11 wherein there is also provided means for pivoting a sub assembly comprising the linkage means, support means and the fluid operated means about a vertical axis.
13. A support assembly as claimed in claim 5 wherein there is also provided an auxiliary support member forming

part of the linkage means and interposed between the linkage arm and the fluid actuated means pivotally attached to the attachment means and the pivotal mounting means to complete a parallelogram linkage between the support means and the attachment means.

14. A support assembly as claimed in claim 13 wherein there is provided biasing means attached to the attachment means and the auxiliary support member to bias the support means to an upper operative position.

15. A support assembly as claimed in claim 14 wherein the biasing means is a tension spring interconnecting the auxiliary support member on an associated pivot pin of the attachment means.

16. A support assembly substantially as herein described with reference to the accompanying drawings.

17. A support assembly for supporting a keyboard or other finger operated control device relative to a fixed support for visual display apparatus including -

support means including an upper planar support surface;

attachment means attachable to said fixed support;

mounting means attachable to said support means;

linkage means interposed between the mounting means and the attachment means and pivotally connected to each of said mounting means and attachment means;

fluid actuated means for actuating movement of the linkage means;

an auxiliary support member for supporting the fluid actuated means and pivotally connected to the fluid actuated means said attachment means and said mounting means;

holding means pivotally attached to the attachment means and connected to the fluid actuated means and further including a lug pivotally mounted thereon operatively associated with the fluid actuated means so as to facilitate expansion or compression of fluid contained therein; and

control means for controlling the fluid actuated means accessible to a person sitting on the support means including a control cable attached to said pivoted lug.

DATED this Fifth day of December, 1988.

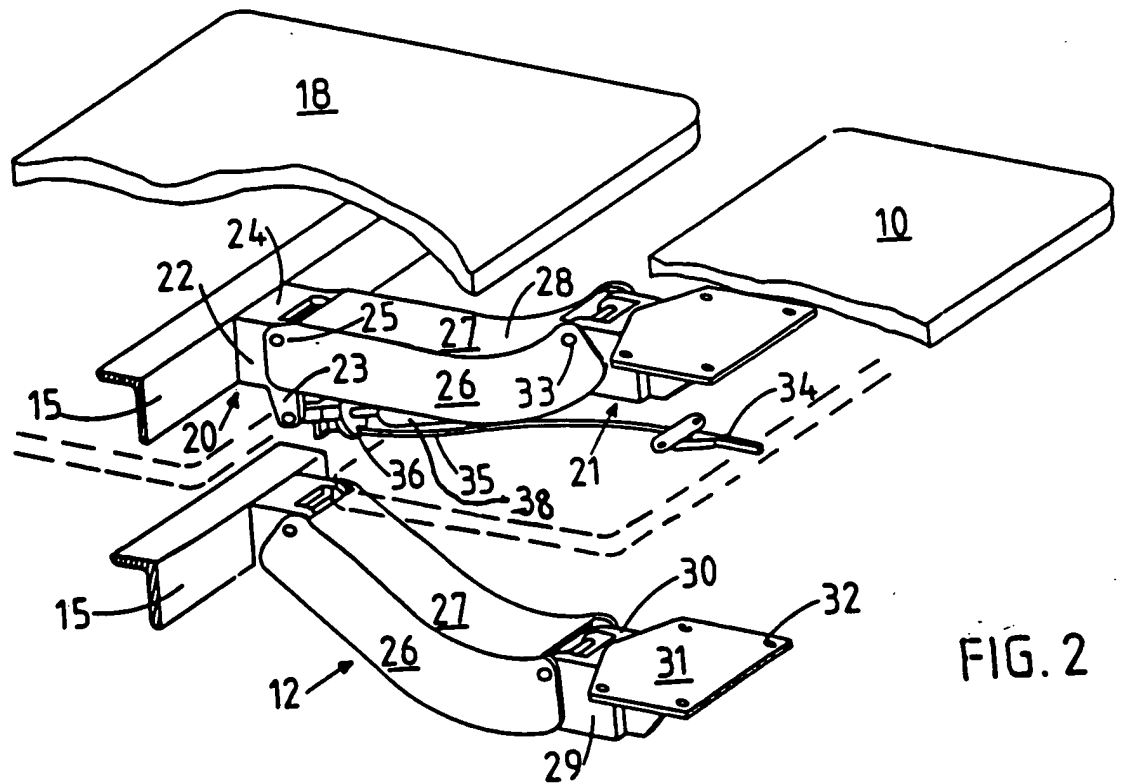
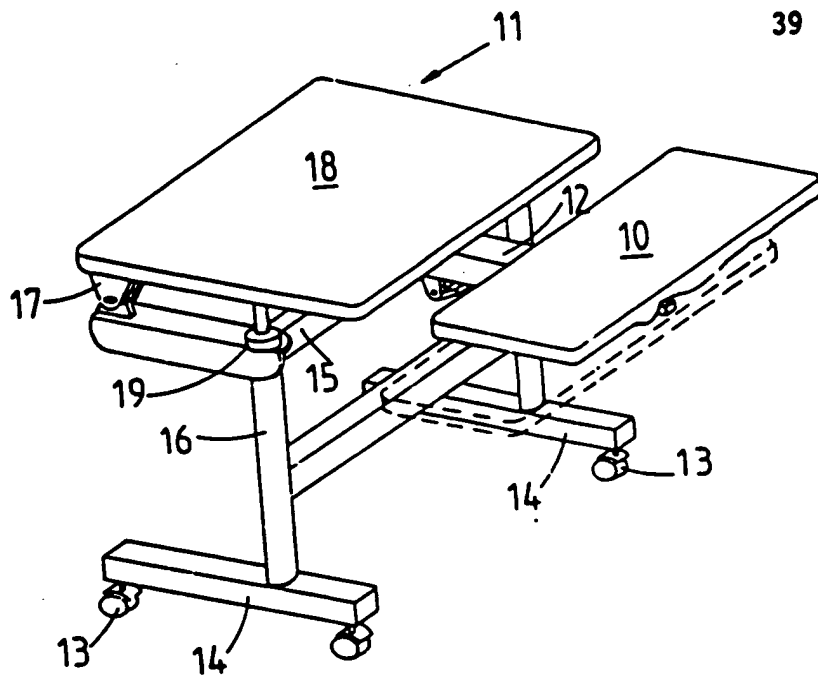
ANSTEY PTY. LTD.

by their Patent Attorneys

G.R. CULLEN & CO.







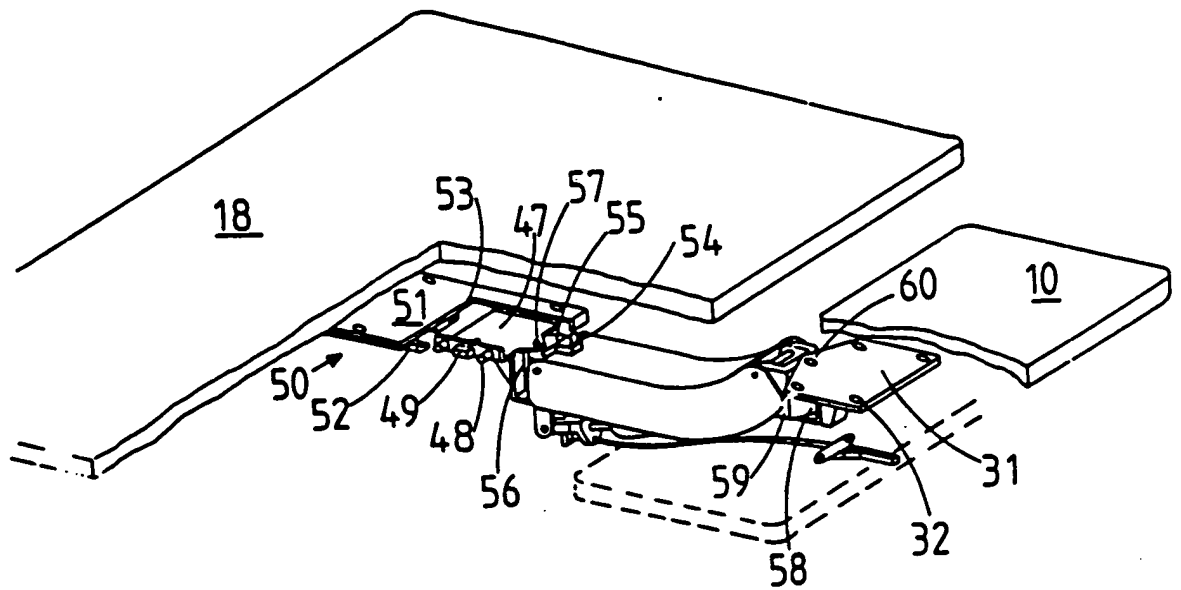


FIG. 3

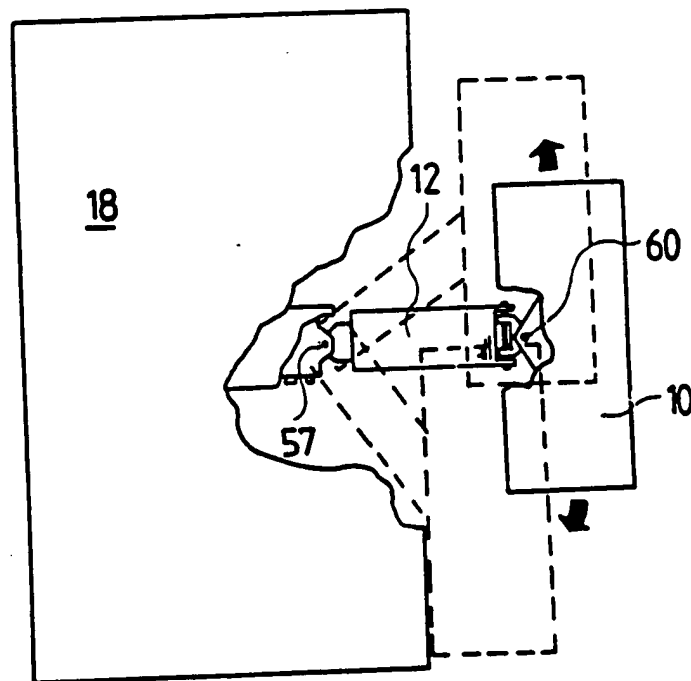


FIG 3a

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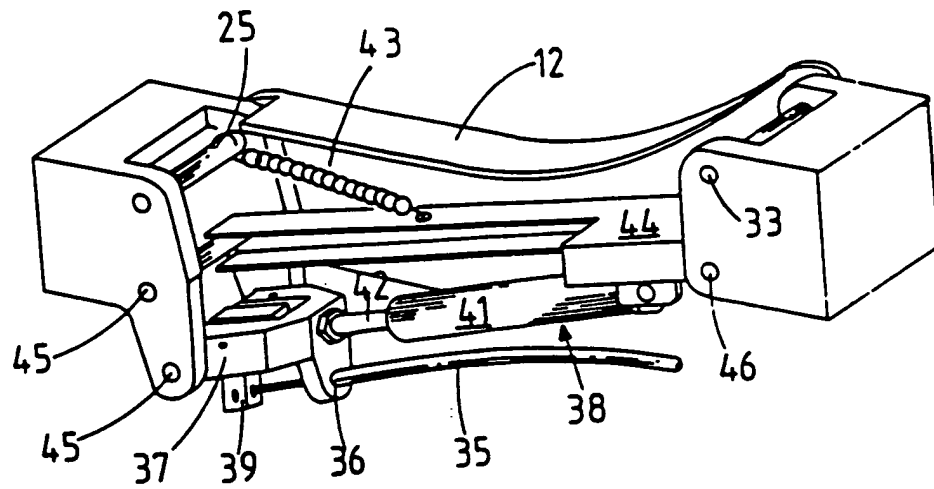


FIG. 4

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**TO: Tom Parker**

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**Foreign Patent**  
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**Date:** 11/4/1999  
  
**Control Number:** 39138  
  
**Patent Number:** AU 581646  
  
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38574

APPLICATION FOR A PATENT

581646

COMPLETE UNDER PROVISIONAL SPECIFICATION No. 14-12-83

ANSTEY PTY. LTD. a company incorporated under the laws of the State of Queensland

of Activity Street, Acacia Ridge, Queensland

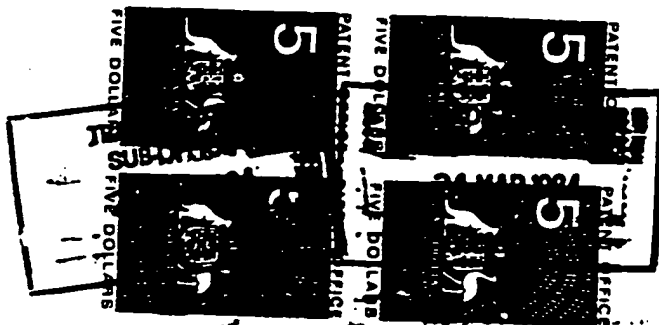
Hereby apply for the grant of a Patent for an invention entitled:

SUPPORT ASSEMBLY

which is described in the accompanying Provisional/Complete Specification.

My address for service is: C/- G.R. Cullen & Company, Patent Attorneys, of 82 Ann Street, Brisbane, in the state of Queensland, Commonwealth of Australia.

DATED this Twentysecond day of March, 1984 .



ANSTEY PTY. LTD.

By their Patent Attorneys  
G.R. CULLEN & COMPANY,

*R.T. Kelly*

R.T. KELLY

To:  
The Commissioner of Patents,  
Commonwealth of Australia.



COMMONWEALTH OF AUSTRALIA  
THE PATENTS ACT 1952

DECLARATION IN SUPPORT OF AN  
APPLICATION FOR A PATENT

In support of the Application made for a patent  
for an invention entitled:  
"Support Assembly"

Insert  
Title of Invention

Insert  
Full Name(s) and  
Address(es)

I/~~We~~ Kenneth David Anstey  
of 36 Activity Street, Acacia Ridge, Queensland,  
4110, Australia  
do solemnly and sincerely declare as follows:—

Insert  
Full Name(s) of  
Applicant(s)

~~I am/we are the applicant(s) for the patent~~  
(or, in the case of an application by a body corporate)  
1. I am/~~We are~~ authorised by Anstey Pty. Ltd.

the applicant(s) for the patent to make this declaration on its/~~their~~ behalf.

2. I am/~~We are~~ the actual inventor(s) of the invention, ~~referred to in the basic application~~

~~(or, in the case of an application by a body corporate, I am/we are the inventor(s) of the invention)~~

Insert  
Name(s) and  
Address(es)  
of  
Inventor(s)

2.

State how Applicant(s)  
derive title from inventor(s)  
e.g. The Applicant(s)  
is/are the assignee(s) of the  
invention from the  
inventor(s)

~~is/are the actual inventor(s) of the invention and the facts upon which the applicant(s)~~  
is/~~are~~ entitled to make the application are as follows:—

The applicant company is the assignee of the said  
invention from the said inventor.

\*Note: Paragraphs  
3 and 4 need only be  
completed for a  
Convention Application

Basic Country(ies)  
Priority Date(s)  
Basic Applicant(s)

3. ~~The basic application(s) as defined by Section 141 of the Act was/were made~~

in ..... on .....  
by .....  
in ..... on .....  
by .....

4. The basic application(s) referred to in paragraph 3 of this Declaration was/were  
the first application(s) made in a Convention country in respect of the invention(s)  
the subject of the application.

Declared at Brisbane, this  
Queensland

16 day of AUGUST 1988

ANSTEY PTY LTD

To: The Commissioner of Patents

G. R. CULLEN & COMPANY

Signature of Declarant(s)  
K. D. ANSTEY  
DIRECTOR.

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- (57) Claim

1.            A support assembly for supporting a control device relative to a fixed support including:  
             support means for supporting the control device;  
             attachment means for attachment of the support assembly to the fixed support;  
             linkage means pivotally interconnecting each of the support means and attachment means;  
             pivotal mounting means pivotally attaching the linkage means to the support means;  
             fluid operated means for actuating movement of the linkage means wherein said support means may move in a direction spaced from the fixed support, said fluid operated means being pivotally attachable to the attachment means and to the pivotal mounting means, and including a cylinder mounted on a piston rod, whereby relative movement may occur between the cylinder and the piston rod upon compression or expansion of fluid within the cylinder; and

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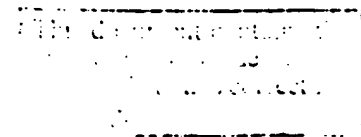
control means for controlling the fluid operated means, said control means comprising a control lever or pedal operatively associated therewith so as to cause said compression or expansion of fluid within the cylinder.



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COMPLETE SPECIFICATION FOR THE INVENTION ENTITLED:

## SUPPORT ASSEMBLY

The following statement is a full description of the invention  
including the best method of performing it known to us:

THIS INVENTION relates to a support assembly for supporting a control device relative to a fixed support or location such as a wall, platform or bench.

5 This invention in one preferred aspect is especially suitable for supporting a keyboard or other finger-operated device relative to a workbench or table which may support visual display apparatus such as the visual display unit (V.D.U) of a computer word processor or other electronic equipment.

10 Hitherto it has been highly desirable to design apparatus for supporting a keyboard relative to a VDU whereby the keyboard was height adjustable relative to the VDU for the main reason that the position of keyboard operator was one that could be filled by a number of people of different heights who therefore would require varying keyboard heights for individual comfort and also to achieve maximum working efficiency. Such support apparatus would be considered preferable for  
15 example to apparatus that could only support the keyboard at a fixed height relative to the VDU such as a rigid support bracket inter-connecting the keyboard carrier to a table carrying the VDU.

In one conventional apparatus of the type described above  
20 there was provided a keyboard support which was mounted on a tubular support shaft wherein a rod or tube attached to the keyboard support was telescopically engageable with the tubular support shaft and there was provided jacking means to make the keyboard support height adjustable relative to the support shaft. Located adjacent the keyboard support  
25 was the work platform or table. While this arrangement was satisfactory in some respects it was found that it was bulky or cumbersome and was difficult to operate by inexperienced personnel such as junior typists. Also the actuating mechanism for initiating movement of the keyboard support was often inaccessible.

30 In another conventional arrangement there was provided a keyboard support which was connected by a linkage arm to a fixed table which carried a VDU. The linkage arm operated on a pantograph or parallelogram linkage which was controlled by springs. When it was desired to lock the keyboard support in a desired position relative to  
35 the VDU it was necessary to actuate a mechanical locking arrangement

which again was not always the most appropriate arrangement to be operated by inexperienced personnel. Also because of the spring control means often the movement of the keyboard support relative to the VDU was uncontrolled or jerky and did not give a smooth controlled movement. Also the mechanical locking arrangement was also found to be relatively difficult to operate in the case of inexperienced personnel and often the locking arrangement was relatively inaccessible to the operator.

It is therefore an object of the invention to provide a support assembly which may alleviate the abovementioned problems associated with the prior art.

Accordingly, the invention provides a support assembly for supporting a control device relative to a fixed support comprising:

support means for supporting the control device;  
attachment means for attachment of the support assembly to the fixed support;  
linkage means pivotally interconnecting each of the support means and attachment means;  
pivotal mounting means pivotally attaching the linkage means to the support means;

fluid operated means for actuating movement of the linkage means wherein said support means may move in a direction spaced from the fixed support, said fluid operated means being pivotally attachable to the attachment means and to the pivotal mounting means, and including a cylinder mounted on a piston rod, whereby relative movement may occur between the cylinder and the piston rod upon compression or expansion of fluid within the cylinder; and

control means for controlling the fluid operated means, said control means comprising a control lever or pedal operatively associated therewith so as to cause said compression or expansion of fluid within the cylinder.



The support means suitably comprises a bench, tabletop, desk or other suitable flat or planar surface for supporting a keyboard, machine or other implement or device.

5 The attachment means may comprise an attachment bracket to a vertical surface such as a wall or horizontal surface such as a bench or table. Preferably the attachment bracket is bifurcated having a web and opposed arms which have a pair of aligned apertures for the insertion therethrough of a first or top pivot pin and a second or lower pivot pin for a reason as hereinafter discussed. The web may be attached to 10 an adjacent vertical surface of a structural member of the table or bench. The attachment bracket may also include a pair of opposed downwardly extending lugs which also have a pair of opposed apertures for the insertion therethrough of a third pivot pin for a reason as hereinafter discussed. 15

20 The linkage means is suitably a linkage arm of integral or one piece construction which preferably is of channel shape having a top web and a pair of downwardly extended and opposed flanges. The rear end of the linkage arm may be provided with a pair of outwardly extending ears or lugs for mounting of the aforementioned top pivot pin which attaches the rear end of the linkage arm to the attachment bracket.

25 However it will be appreciated that the linkage means or linkage arm may be of any suitable shape other than that described above such as being substantially planar or platelike if desired having a pair of opposed broad surfaces and a pair of opposed narrow surfaces or edges.

30 The linkage means may be curved or tapered intermediate its length so as to facilitate the support means being located in a common horizontal plane with the fixed support if desired.

There also may be provided mounting means such as a mounting bracket attaching the front end of the linkage arm to the support means. Preferably the mounting bracket may adopt



the same shape as the attachment bracket having a channel shape with a front web and opposed rearwardly extending flanges. The mounting bracket may also include a top pivot pin for pivotally supporting the front end of the linkage arm and a second pin for a reason as hereinafter discussed.

The fluid operated means for actuating pivotal movement of the linkage arm may be hydraulic or pneumatic in nature. Preferably however the fluid operated means is a gas spring including a cylinder mounted on a piston rod whereby suitably relative movement may occur between the cylinder and the piston rod so as to compress gas within the cylinder. A suitable gas spring is for use in the invention is one marketed under the SUSPA trade mark or BLOCK-O-LIFT trade mark and manufactured by West German firms.

In a preferred form of gas spring for use in the invention there may be provided an inner sleeve or piston having a central gas chamber and an outer concentric gas chamber. Relative movement may occur between the inner sleeve and an outer sleeve or cylinder containing an end gas chamber. At its free end or end remote from the outer sleeve the inner sleeve may contain a valve mechanism having a valve stem initially movable downwardly or inwardly relative to the surrounding inner sleeve to reach an open position so as to allow communication between the central gas chamber, the concentric gas chamber and the end chamber. In a compression stroke gas exits from the central gas chamber to the end



- chamber via the concentric chamber and in an expansion stroke the reverse occurs. In either the compression stroke or expansion stroke relative movement occurs between the cylinder and piston.

There also may be provided control means for controlling the fluid operated means. In one form this may comprise a valve for controlling flow of fluid into or out of the cylinder with specific reference to a hydraulic ram assembly or pneumatic ram assembly. With specific reference to the embodiment described above this may comprise a control lever attached to an operating cable which is secured to a lug pivotally mounted to a holding bracket interposed between the rear attachment bracket and the piston of the gas spring referred to above. The pivoted lug may be attached to the valve stem of the valve mechanism previously described. Upon movement of the operating cable this may effect inward movement of the valve stem to cause the cylinder to move relative to the piston which is fixed in this particular embodiment.

In another form the control means may comprise a foot or knee operated pedal for causing movement of the operating cable in substitution of a finger operated control lever as described above.

In an alternative embodiment the attachment bracket may be associated with a track or channel member for reciprocation in a forward or reverse direction which track may be attached to the underside of a bench or table supporting the VDU. In this embodiment there also may be provided means for pivoting the assembly of support means and linkage means about a vertical axis so that the assembly may be moved rearwardly whereby said attachment bracket may move on the track and subsequently pivoted so as to be retracted or be located underneath the table or bench supporting the VDU.

Reference may now be made to a preferred embodiment of the invention as shown in the accompanying drawings wherein:

FIG 1 is a perspective view of a support assembly constructed in accordance with the invention;

FIG 2 is a partly broken away perspective view of the linkage arm interconnecting the keyboard support and the work table which supports the VDU of the assembly shown in FIG 1;

FIG 3 is a perspective view of the modified support assembly constructed in accordance with the invention; FIG 3a is a top plan view of the modified support assembly shown in FIG 3; and

FIG 4 is a view similar to FIG 2 but showing portion of the linkage arm broken away to illustrate the gas spring and support member therefor.

In the drawings there is shown keyboard support 10 and work table 11 and linkage arm 12 interconnecting support 10 and work table 11. Work table 11 is mounted on castors 13 and includes horizontal legs 14, uprights 16 and frame members 15. There is also shown pivot joints 17 interconnecting tabletop 18 to frame members 15 and angle adjustment mechanism 19 for adjustment of the angle of tabletop 18 relative to the horizontal.

The linkage arm 12 is attached to rear attachment bracket 20 and also to front mounting bracket 21. Bracket 20 includes opposed sides 22 and downwardly extending lugs 23. The web 24 of bracket 20 is welded to frame member 15. There is also shown top pivot pin 25 pivotally attaching linkage arm 12 to bracket 20.

The linkage arm 12 is channel shaped as shown having opposed side walls 26 and top web 27 and is bent or curved at 28 so as to allow keyboard support 10 to be located in substantially the same horizontal plane as tabletop 18 if desired.

There is also shown front mounting bracket 21 which is also channel shaped having opposed sides 29, and web part 30 which has attachment plate 31 welded thereto. Plate 31 has attachment apertures 32 for attachment to keyboard 10 by bolts or screws (not shown). There is also shown top pivot pin 33 pivotally attaching bracket 21 to linkage arm 12.

Also shown is control lever 34 which is readily accessible to the operator of keyboard support 10 as shown. Lever 34 controls operation of operating cable 35 which extends through aperture 36 of end mounting member 37 of gas spring 38 best shown in FIG 4. Mounting member 37 also has a pivoted lug 39 which when pulled forwardly by cable 35 actuates the valve member (not shown) of gas spring 38 thereby resulting in actuation of gas spring 38 whereby cylinder 41 will move on piston rod 42 to thereby pivot linkage arm 12 relative to brackets 20 and 21. In FIG 1 or FIG 4 the gas spring 38 is shown in an extended position whereby keyboard support 10 is substantially in the same horizontal plane as tabletop 18. In a retracted position the keyboard support 10 will be located below tabletop 18 as best shown in FIG 2 in dotted outline

wherein piston rod 42 will be fully retracted within cylinder 41. There is also shown tension spring 43 attached to top pivot pin 25 which is also attached to support member 44 for gas spring 38.

There are also shown bottom pivot pins 45, 45A and 46 of rear bracket 20 and front bracket 21 which pivotally attach support member 44 to both brackets 20 and 21 as best shown in FIG 4. Tension spring 43 biases keyboard support to the upper position as is also shown in FIG 4.

In FIGS 3 and 3A the rear bracket 20 is modified so as to be attached to a slider plate 47 having roller bearings 48 and friction pad 49 made of resilient material. The slider plate 47 may reciprocate back and forth on track 50 having a top plate component 51 and track rails 52. There is also shown stop member 53 and mating stop member 54 on linkage arm 12 which prevents keyboard support 10 from moving below tabletop 18 in any position other than the lowest or minimum position. There is also shown rear pivot block 55 having adjacent bearing faces 56 which is mounted on vertical pivot pin 57 and front pivot block 59 having adjacent bearing faces 58 which is mounted on front vertical pivot pin 60.

In the lowest or minimum position as shown in dotted outline keyboard support 10 may be fully retracted below tabletop 18. Both keyboard support 10 and linkage arm 12 are independently pivotable as shown by the arrows. This is useful in the situation where two people are sharing the same keyboard mounted on keyboard support 10.

In operation of the abovementioned preferred embodiment the keyboard support 10 may be adjusted infinitely insofar as height adjustment is concerned relative to tabletop 18 by actuation of control lever 34. When it is desired to lower keyboard support 10 the gas spring 37 will be in a compression stroke as described previously and when the keyboard support 10 is being elevated the gas spring 37 will be in an expansion stroke.

The support assembly is therefore constructed with a view to providing appropriate vertical adjustment of keyboard support 10 relative to tabletop 18 with the least physical effort. The provision of pivot pins 25, 45A, 33 and 46 provide a parallelogram linkage between the keyboard support 10 and the fixed frame member 15 constituted by linkage arm 12 and support member 44.



The claims defining the invention are as follows:

1. A support assembly for supporting a control device relative to a fixed support including:

support means for supporting the control device;

attachment means for attachment of the support assembly to the fixed support;

linkage means pivotally interconnecting each of the support means and attachment means;

pivotal mounting means pivotally attaching the linkage means to the support means;

fluid operated means for actuating movement of the linkage means wherein said support means may move in a direction spaced from the fixed support, said fluid operated means being pivotally attachable to the attachment means and to the pivotal mounting means, and including a cylinder mounted on a piston rod, whereby relative movement may occur between the cylinder and the piston rod upon compression or expansion of fluid within the cylinder; and

control means for controlling the fluid operated means, said control means comprising a control lever or pedal operatively associated therewith so as to cause said compression or expansion of fluid within the cylinder.

2. A support assembly as claimed in claim 1 wherein the support means includes a substantially planar support surface which in use is oriented in a direction substantially parallel to a corresponding planar support surface of the fixed support.

3. A support assembly as claimed in claim 1 or 2 wherein the attachment means includes an attachment bracket having a pair of adjacent arms and a pivot pin interconnecting each arm and operatively attached to the linkage means.

4. A support assembly as claimed in claim 3 wherein the attachment bracket also includes a web interconnecting each adjacent arm thereof and attachable to a mating surface of the fixed support.

5. A support assembly as claimed in any preceding claim wherein the linkage means includes a linkage arm which is curved or tapered intermediate its length so as to facilitate the support means to be located in a common horizontal plane with the fixed support if desired.

6. A support assembly as claimed in claim 5 wherein the linkage arm is channel shaped having a top web and pair of opposed flanges.

7. A support assembly as claimed in any preceding claim wherein the pivotal mounting means includes a mounting bracket having a pair of adjacent arms and an interconnecting web or mounting plate attached to the support means.

8. A support assembly as claimed in claim 7 wherein there is further provided a pivot pin interconnecting each adjacent arm of said pivotal mounting means and operatively associated with the linkage means.

9. A support assembly as claimed in claim 10 wherein the control means for controlling the fluid operated means is accessible to a person sitting at the support means.

10. A support assembly as claimed in any preceding claim wherein there is further provided a lug pivotally mounted to a holding bracket operatively associated with the fixed support and which lug is attached to a control cable associated with the control means wherein said lug is actuated to cause said compression or expansion of fluid within said cylinder.

11. A support assembly as claimed in any preceding claim wherein the attachment means is operatively associated with a track or channel member for reciprocation in a forward or reverse direction relative to the fixed support.

12. A support assembly as claimed in claim 11 wherein there is also provided means for pivoting a sub assembly comprising the linkage means, support means and the fluid operated means about a vertical axis.

13. A support assembly as claimed in claim 5 wherein there is also provided an auxiliary support member forming

part of the linkage means and interposed between the linkage arm and the fluid actuated means pivotally attached to the attachment means and the pivotal mounting means to complete a parallelogram linkage between the support means and the attachment means.

14. A support assembly as claimed in claim 13 wherein there is provided biasing means attached to the attachment means and the auxiliary support member to bias the support means to an upper operative position.

15. A support assembly as claimed in claim 14 wherein the biasing means is a tension spring interconnecting the auxiliary support member on an associated pivot pin of the attachment means

16. A support assembly substantially as herein described with reference to the accompanying drawings.

17. A support assembly for supporting a keyboard or other finger operated control device relative to a fixed support for visual display apparatus including -

support means including an upper planar support surface;

attachment means attachable to said fixed support;

mounting means attachable to said support means;

linkage means interposed between the mounting means and the attachment means and pivotally connected to each of said mounting means and attachment means;

fluid actuated means for actuating movement of the linkage means;

an auxiliary support member for supporting the fluid actuated means and pivotally connected to the fluid actuated means said attachment means and said mounting means;

holding means pivotally attached to the attachment means and connected to the fluid actuated means and further including a lug pivotally mounted thereon operatively associated with the fluid actuated means so as to facilitate expansion or compression of fluid contained therein; and

control means for controlling the fluid actuated means accessible to a person sitting on the support means including a control cable attached to said pivoted lug.

DATED this Fifth day of December, 1988.

ANSTEY PTY. LTD.

by their Patent Attorneys

G.R. CULLEN & CO.

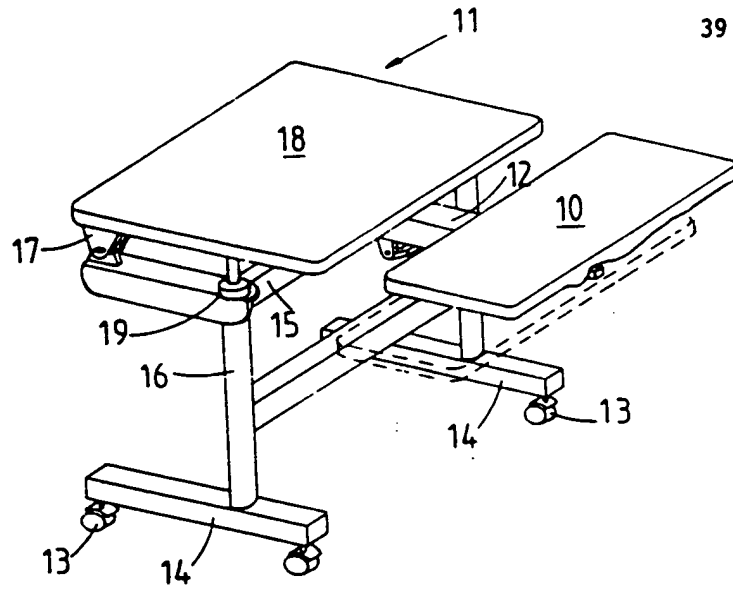


FIG. 1

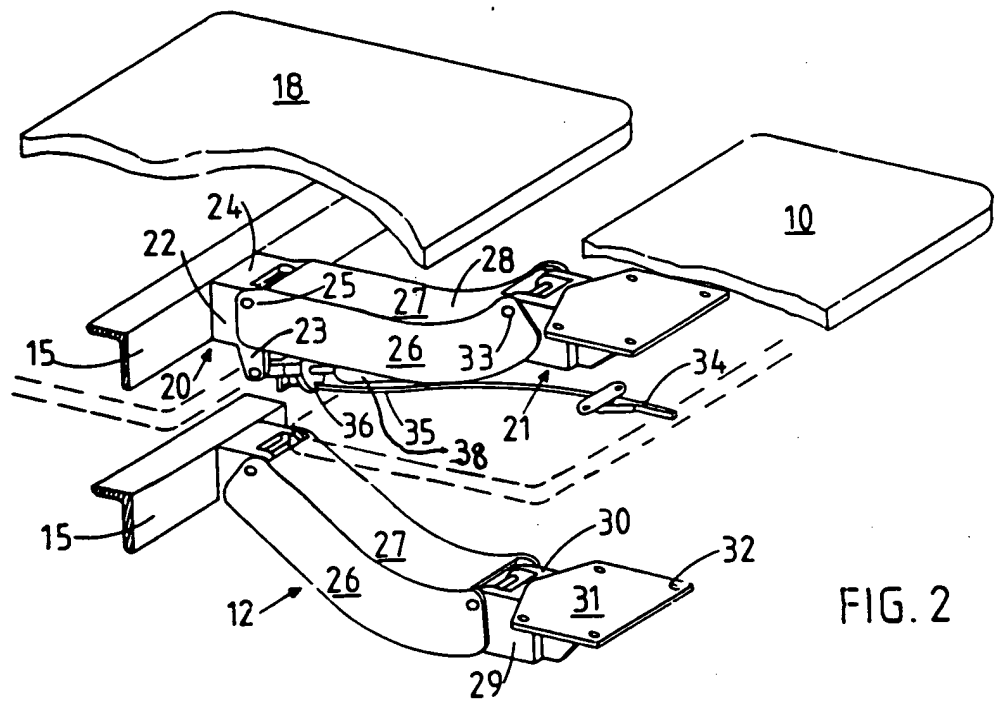


FIG. 2

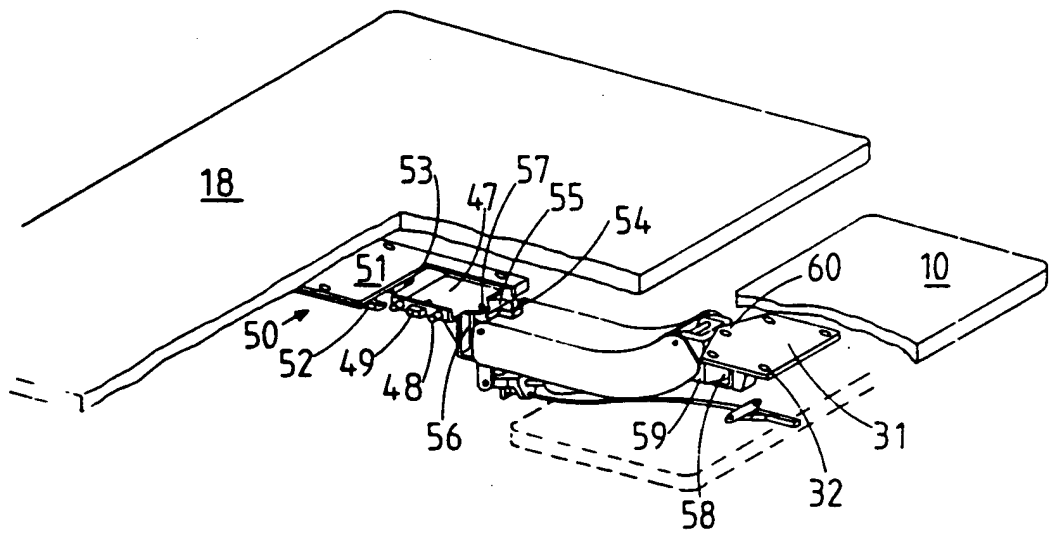


FIG. 3

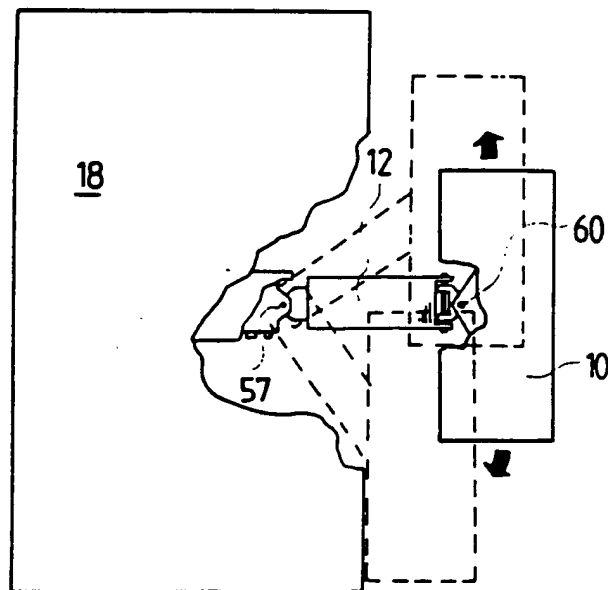


FIG 3a

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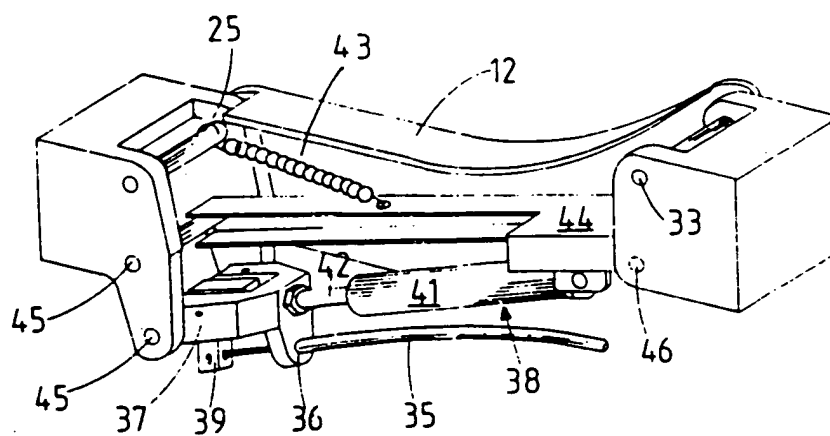


FIG. 4